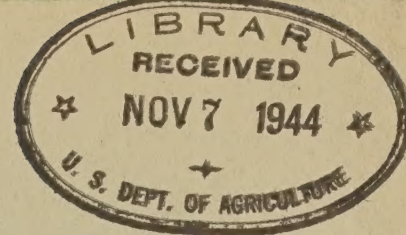


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AGRICULTURAL NOTES

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THE INTRODUCTION AND COLONIZATION IN PUERTO RICO OF

MACROCENTRUS ANCYLIVORUS

BY

KENNETH A. BARTLETT, ASSISTANT ENTOMOLOGIST,
DIVISION OF FOREIGN PARASITE INTRODUCTION,
BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE,
UNITED STATES DEPARTMENT OF AGRICULTURE /A

MACROCENTRUS ANCYLIVORUS A POSSIBLE PARASITE OF BEAN POD BORERS.

A SHORT NOTE REPORTED BY R. CECIL IN THE BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE NEWS LETTER, VOLUME II, NUMBER 10, CALLED THE WRITER'S ATTENTION TO THE SUCCESSFUL REARING OF MACROCENTRUS ANCYLIVORUS ROHWER ON LARVAE OF THE LIMA-BEAN POD BORER, ETIELLA ZINCKENELLA TREITSCHKE. WHILE IT HAS NOT BEEN DEMONSTRATED THAT THIS PARASITE WILL SUCCESSFULLY REPRODUCE ON THIS BEAN PEST IN THE FIELD, IT SEEMED WORTH WHILE TO ATTEMPT ITS ESTABLISHMENT IN PUERTO RICO. THIS PROJECT WAS UNDERTAKEN AS ONE OF THE BIOLOGICAL CONTROL MEASURES CARRIED ON BY THE BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE IN PUERTO RICO DURING 1935 AND 1936.

POD BORERS ARE IMPORTANT BEAN PESTS TO WINTER VEGETABLE GROWERS.

THE THREE SPECIES OF POD BORERS WHICH COMMONLY ATTACK BEANS IN PUERTO RICO ARE ETIELLA ZINCKENELLA TREITSCHKE, MARUCA TESTULALIS GEYER, AND FUNDELLA CISTIPENNIS DYAR. THESE THREE INSECT PESTS ARE OFTEN HIGHLY DESTRUCTIVE AND OF PARTICULAR IMPORTANCE TO THE GROWER WHO SHIPS HIS BEAN CROP TO THE CONTINENT DURING THE WINTER MONTHS AS A FRESH GREEN VEGETABLE.

/A. NOW ASSOCIATE ENTOMOLOGIST, PUERTO RICO EXPERIMENT STATION, UNITED STATES DEPARTMENT OF AGRICULTURE.

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THE THREE SPECIES OF BEAN POD BORERS ARE SIMILAR IN LIFE HISTORY. THE YOUNG LARVAE FEED ON THE BLOSSOMS AND CAUSE THEM TO DROP PREMATURELY. AS THE LARVAE INCREASE IN SIZE THEY ENTER THE PODS, WHERE THEIR FEEDING RESULTS IN CONSIDERABLE DIRECT DAMAGE TO THE BEANS THEMSELVES AND MAY ALSO INDUCE THE GROWTH OF ROT FUNGI THAT CAUSE SECONDARY DAMAGE. THE LARVAE OF ETIELLA ZINCKENELLA AND FUNDELLA CISTIPENNIS USUALLY PUPATE IN THE SOIL, WHILE THE LARVAE OF MARUCA TESTULALIS GENERALLY PUPATE IN TRASH OR ON THE SURFACE OF THE SOIL. THE ADULTS OF ALL THREE PESTS ARE MOTHS WHICH DEPOSIT THEIR EGGS USUALLY ON THE BLOSSOMS OF THE PLANTS.

8,729 ADULTS OF MACROCENTRUS ANCYLIVORUS WERE INTRODUCED.

FIVE SHIPMENTS OF MACROCENTRUS ANCYLIVORUS WERE MADE TO PUERTO RICO DURING 1935. THESE SHIPMENTS WERE ASSEMBLED BY H. W. ALLEN OF THE ORIENTAL FRUIT MOTH LABORATORY AT MOORESTOWN, N. J., AND FORWARDED BY AIR EXPRESS TO SAN JUAN. TABLE I GIVES THE DATES OF SHIPMENT, THE NUMBERS OF PARASITES SHIPPED, AND THE PERCENT ALIVE ON ARRIVAL.

TABLE I.—THE SHIPMENTS OF MACROCENTRUS ANCYLIVORUS TO PUERTO RICO DURING 1936, GIVING DATES, NUMBERS SHIPPED, AND NUMBERS AND PERCENT LIVING ON ARRIVAL

DATES	NUMBERS SHIPPED	NUMBERS LIVING ON ARRIVAL	PERCENT LIVING ON ARRIVAL
JULY 2	3,200	3,077	93.2
JULY 8	2,950	2,869	97.2
JULY 9	1,500	1,483	98.9
JULY 26	678	527	77.7
JULY 30	401	340	84.8
TOTALS	8,729	8,296	95.0

THE TIME FROM PACKING TO LIBERATION RANGED FROM 48 TO APPROXIMATELY 100 HOURS WITH USUALLY AT LEAST 3 DAYS ELAPSING DURING THE SHIPPING PERIOD. IN THE LAST TWO SHIPMENTS THE PARASITE ADULTS WERE HELD FOR SOME DAYS AT THE MOORESTOWN LABORATORY PREVIOUS TO SHIPMENT IN ORDER TO ACCUMULATE SUFFICIENT NUMBERS. THE SHIPMENT OF THIS SPECIES BY AIR EXPRESS GAVE EXCELLENT RESULTS WHEN THE PERIOD OF SHIPMENT WAS 4 DAYS OR LESS.

MACROCENTRUS ANCYLIVORUS WAS SUCCESSFULLY REARED ON POD BORERS.

SOME OF THE MATERIAL OF M. ANCYLIVORUS RECEIVED WAS RETAINED FOR LABORATORY EXPERIMENTS. THE PARASITE WAS SUCCESSFULLY REARED ON TWO SPECIES OF POD BORERS, E. CISTIPENNIS AND M. TESTULALIS. LARVAE OF E. ZINCKENELLA WERE NOT AVAILABLE FOR EXPERIMENTAL REARING WORK. THIS PARASITE SPECIES WAS ALSO REARED ON THE LESSER CORN STALK BORER, ELASMOPALPUS LIGNOSELLUS ZELLER.

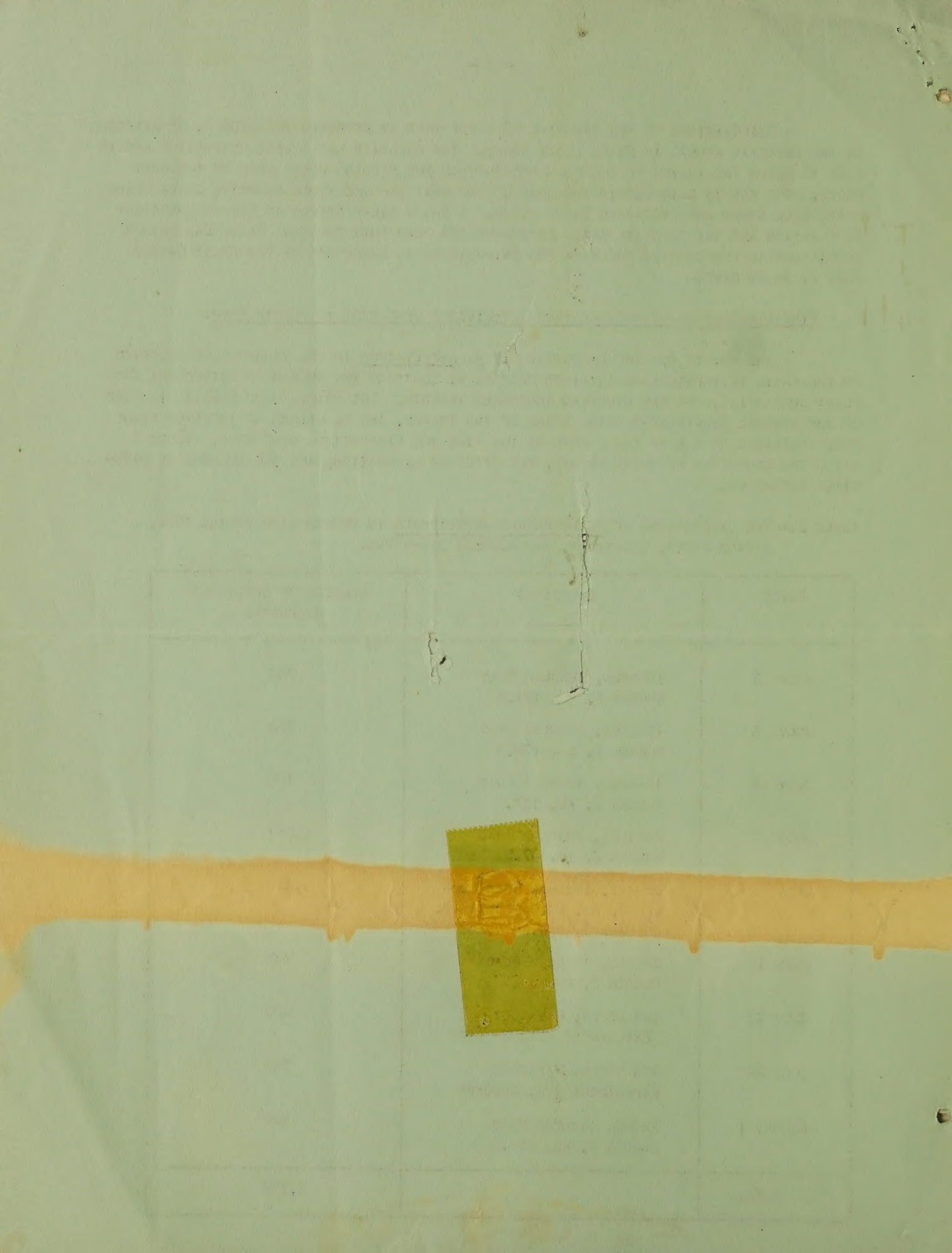
OVIPOSITIONS BY THE PARASITE WERE OBTAINED BY EXPOSING INFESTED PLANT MATERIAL TO THE PARASITE ADULTS IN SMALL CLOTH CAGES. THE PARASITE HAS A LONG OVIPOSITOR AND IS ABLE TO REACH THE INSIDE OF THE BEAN POD THROUGH THE FEEDING HOLES MADE BY THE HOST LARVA. THE EGG IS LAID WITHIN THE BODY OF THE HOST AND THE YOUNG PARASITE LARVA FEEDS UNTIL FULL GROWN AND EMERGENCE TAKES PLACE. A BROWN SILKY COCOON IS SPUN PREPARATORY TO PUPATION AND THE PARASITE ADULT LATER EMERGES FROM THIS COCOON. UNDER LABORATORY CONDITIONS IN PUERTO RICO THE TIME FOR OVIPOSITION TO EMERGENCE OF THE ADULT RANGED FROM 21 TO 29 DAYS.

NINE LIBERATIONS OF MACROCENTRUS ANCYLIVORUS WERE MADE IN PUERTO RICO.

THE POINTS FOR THE LIBERATION OF M. ANCYLIVORUS IN THE ISLAND WERE SELECTED ON THE BASIS OF INFORMATION OBTAINED FROM L. B. SCOTT OF THE BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE, WHO WAS STUDYING VEGETABLE INSECTS. THE POINTS WERE LOCATED IN SOME OF THE GENERAL VEGETABLE-GROWING AREAS OF THE ISLAND, AND PLANTINGS OF INFESTED BEANS WERE AVAILABLE AT ALL OF THE POINTS AT THE TIME THE LIBERATIONS WERE MADE. TABLE 2 GIVES THE LOCATIONS OF THESE POINTS, THE DATES OF LIBERATION, AND THE NUMBERS OF PARASITES LIBERATED.

TABLE 2.—THE LIBERATIONS OF MACROCENTRUS ANCYLIVORUS IN PUERTO RICO DURING 1936, GIVING DATES, LOCATIONS, AND NUMBERS LIBERATED.

DATES	LOCATIONS	NUMBERS OF SPECIMENS LIBERATED
JULY 3	ISABELA, INSULAR ROAD NUMBER 2, KM. 134.8	765
JULY 3	ISABELA, INSULAR ROAD NUMBER 2, KM. 135.9	768
JULY 3	ISABELA, INSULAR ROAD NUMBER 2, KM. 137.4	780
JULY 8	HATILLO, INSULAR ROAD NUMBER 2, KM. 97.5	1,541
JULY 8	MANATÍ, INSULAR ROAD NUM- BER 2, KM. 60.0 WEST 1 KM. ON MANATÍ-ARECIBO ROAD	1,328
JULY 10	CAGUAS, INSULAR ROAD NUMBER 2, KM. 34.5	742
JULY 10	LAS MESAS, MAYAGUEZ EXPERIMENT STA. GROUNDS	493
JULY 27	LAS MESAS, MAYAGUEZ EXPERIMENT STA. GROUNDS	527
AUGUST 1	YAUCO, INSULAR ROAD NUMBER 2, KM. 230.0	340
TOTAL		7,284



FIELD RECOVERIES OF M. ANCYLIVORUS HAVE NOT BEEN MADE.

ONLY A FEW FIELD OBSERVATIONS AND A FEW SMALL COLLECTIONS OF INFESTED BEANS HAVE BEEN MADE SINCE THE RELEASE OF THESE PARASITES. NO RECOVERIES HAVE BEEN MADE TO DATE, BUT SUFFICIENT OBSERVATIONS HAVE NOT BEEN MADE TO DETERMINE DEFINITELY THE STATUS OF THIS PARASITE. ON THE NORTH AMERICAN CONTINENT THIS SPECIES IS A COMMON PARASITE OF THE STRAWBERRY LEAF-ROLLER ANCYLIS COMPTANA FROEL. AND THE ORIENTAL FRUIT MOTH, LASPEYRESIA MOLESTA BUSCK. AS PREVIOUSLY STATED, IT HAS BEEN REARED UNDER LABORATORY CONDITIONS ON THE LIMA-BEAN POD BORER IN CALIFORNIA. IT HAS ALSO BEEN REARED ON THREE NATIVE INSECT PESTS IN PUERTO RICO. WITH SUCH A WIDE AND VARIED HOST RANGE IT SEEMS QUITE PROBABLE THAT THE SPECIES WILL ESTABLISH ITSELF AS A PARASITE OF SOME OF THE INSECT PESTS OF PUERTO RICO.

